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| 09/715,651 | 11/17/2000 | Harold Alexis Huggins | Huggins 6 (58638) | 8052 |

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| EXAMINER |
|---|
| VINH, LAN |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1765 | 10 |

DATE MAILED: 12/04/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/715,651 | Applicant(s) HUGGINS, HAROLD ALEXIS | |
|---|---|---|---|
| | Examiner Lan Vinh | Art Unit 1765 | |

*-- The MAILING DATE of this communication appears on th cover sheet with th correspond nc address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *28 October 2002* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,4,5,8,9,11-14,17,20-24 and 26-35* is/are pending in the application.

4a) Of the above claim(s) *29-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,8,9,11-14,17,20-24 and 26-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 4, 5,11-14,17, 22-24, 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Chong et al (US 6,093,330) and further in view of Nakaki et al (US 5,998,861 )

Krishaswamy discloses a method for forming dielectric membranes for thin film devices such as film bulk acoustic resonator/RF component. This method comprises the steps of:

forming a dielectric layer 103 on a semiconductor substrate 101 ( col 5, lines 32-34)

forming a patterned electrode/conductive layer layer 109 on the dielectric layer 103 to form a film bulk acoustic resonator (FBAR) ( col 5, lines 35-36 ; fig. 5B ) reads on forming and patterning a conductive layer on the dielectric layer to define the RF component

forming a plurality of vias/openings 113 on opposite sides ( all openings 113 stops/terminates at the substrate ) through the FBAR component and the dielectric layer to the substrate ( col 5, lines 51-53; fig. 5D shows openings 113 are on opposide sides )

exposing the semiconductor substrate to a dry fluorine etchant to form an air gap beneath the FBAR component which remove the FBAR component from the substrate ( col 6, lines 5, lines 59-63; col 6, lines 15-17 and fig. 5F ) reads on removing/releasing the RF component from the substrate by exposing the substrate to an etchant.

Unlike the instant claimed inventions as per claims 1,14, 23, Krishaswamy fails to disclose the specific spacing range between the opening and the diameter of the openings.

However, Chong, in a process for making microstructures, discloses that the diameter and spacing of the subsurface structure (opening ) can be varied and controlled by the parameters of the etching process (col 4, lines 41-51 )

Hence, one skilled in the art would have found it obvious to modify Krishaswamy an by adjusting/varying the etching parameters to vary the diameter and spacing in view of Chong using routine experimentation to produce any desired range for the spacing and diameter of the claimed opening. It is also noted that it would have been obvious to one skilled in the at the time the invention was made to vary the diameter and spacing /variables of Krishaswamy's opening since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215(CCPA 1980)

Krishaswamy and Chong do not specifically discloses that the etchant/$XeF_2$ gas is passed through the opening/openings to the substrate.

However, Nakaki discloses a method for forming a sensor component on a semiconductor substrate comprises the step of passing $XeF_2$ gas through substrate-

removing holes/openings 2 to remove sensing element 3 from the substrate ( col 4, lines 10-12; col 4, lines 65-66 )

Since both Krishaswamy and Nataki are concerned with exposing the semiconductor structure having opening to fluorine etchant to remove/release the component from the substrate, one skilled in the art would have found it obvious to modify Krishaswamy and Chong by passing $XeF_2$ gas through substrate-removing holes/openings as per Nataki because according to Nataki as a result of the substrate removal by the dry process using $XeF_2$ gas, the substrate below the sensing-element/component is completely removed and it is possible to obtain a desired structure (col 6, lines 12-16 )

Regarding claims 4-5, 17, Krishaswamy discloses forming a plurality of vias/openings 113 adjacent to the conductive layer, the openings do not extend through the conductive layer 109 (fig. 5F)

Regarding claim 24, fig. 5F of Krishaswamy shows uniform spacing between the openings 113.

Regarding claims 11, 22, 28, Krishaswamy discloses that the substrate is silicon ( col 5, lines 34-35 )

Regarding claims 12, 13, fig. 5F of Krishaswamy shows that the openings 113 contacts the air gap 115 in the substrate which reads on the openings extend into the substrate. Fig. 5D shows that openings 113 terminate at the substrate 101.

3. Claims 8, 20, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Chong et al (US 6,093,330 ) and further in view of Nakaki et al (US 5,998,861 ) and Dydyk et al (US 6,131,256 )

Krishaswamy as modified by Chong and Nakaki has been described above in paragraph 2. Unlike the instant claimed inventions as per claims 8, 20, 26, Krishaswamy, Chong and Nakaki do not disclose forming the electrode/conductive layer comprises of aluminum.

However, Dydyk discloses forming a resonator/RF component having an electrode layer of aluminum ( col 2, lines 16-18)

Since Krishaswamy is directed to a method of forming a resonator, one skilled in the art would have found it obvious to modify Krishaswamy, Chong and Nakaki by forming the electrode/conductive layer comprises of aluminum as per Dydyk because according to Dydyk using low acoustic loss material (Al) has less of an impact on the Q ( quality factor of material ) of the resonator structure ( col 2, lines 17-20 )

4. Claims 9, 21, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Krishaswamy et al (US 5,853,601 ) in view of Chong et al (US 6,093,330) and further in view of Nakaki et al (US 5,998,861 ) and Dydyk et al (US 5,424,698 )

Krishaswamy as modified by Chong and Nakaki has been described above in paragraph 2. Krishaswamy, Chong and Nakaki differ from the instant claimed inventions as per claims 9, 21, 27 by forming a dielectric layer of silicon oxide instead of silicon nitride.

However, Dydyk (698), in a method of forming a semiconductor resonator, discloses forming a dielectric layer of any convenient insulating material includes silicon oxide and silicon nitride ( col 4, lines 50-52 )

Hence, one skilled in the art would have found it obvious to modify Krishaswamy, Chong and Nakaki by using silicon nitride as a dielectric layer in view of Dydyk teaching because both silicon nitride and silicon oxide are convenient dielectric material, thus the substitution of one for the other would have produced an expected result.

***Response to Arguments***

5. Applicant's arguments filed 10/28/2002 have been fully considered but they are not persuasive.

The argument that neither Krishaswamy nor Nataki teaches forming a plurality of substantially circular holes on opposing side and through the RF component, as recited in claims 1, 14, 23, does not commensurate with the scope of claims 1, 14, 23 because the limitation of substantially circular holes is not recited in the claims. Since Krishaswamy discloses forming a plurality of via/opening 113 on opposing side and through the RF component (fig. 5D), it reads on teaches forming a plurality of openings on opposing sides and through the RF component as recited in claims 1, 14, 23.

It is also argued that one skilled in the art would not be motivated to form the openings in the way as recited in the claimed invention because Krishaswamy teaches a very controlled process that require an etch time of 125 minutes while it is noted that the claimed etching via provide a much faster etch rate than disclosed in Krishaswamy.

This argument also does not commensurate with the scope of claims 1, 14, 23 because claims 1, 14, 23 do not require any etch rate since the claim language of a much faster etch rate is not recited in the claims.

In response to applicant's argument that there is no suggestion to combine the references of Krishaswamy and Nakaki because there is no motivation to combine them, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, since the motivation to combine the references comes from Nakaki (see paragraph 2), one skilled in the art would have found it obvious to incorporate Nakaki's teaching into Krishaswamy method to produce the claimed invention.

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.

ROBERT KUNEMUND
PRIMARY EXAMINER

LV
November 25, 2002